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ABSTRACT

A total of 28 advantaged and 28 disadvantaged 5-year-old children who had been tested in a previous study designed to measure some of the skills and characteristics thought to be related to academic success (ED 032 929) were retested after a 6-month interval during which they had had a preschool experience. Two measures of object exploratory behavior, one of ability to inhibit motor behavior under verbal and modeled request and one of impulsivity-reflectivity were used. Stimulus rather than subject characteristics seemed to account for object exploratory behavior. Reflectivity was found to increase with age. (Author/AJ)

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REEXAMINING VARIABLES AFFECTING COGNITIVE FUNCTIONING IN PRESCHOOL CHILDREN: A FOLLOW-UP

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The study reported here was a follow-up on research carried out by Mumbauer and Miller (1970). It focused on questions emerging from the findings of that study. One of these findings was that advantaged Ss spent less time looking at the toys in the Reactive Object Curisoity Test (ROCT) than disadvantaged Ss. Two explanations were entertained. The first was that perhaps because the stimuli were simple dime store toys, they lacked novelty and interest for the more advantaged groups but had more of these properties for the disadvantaged. The other explanation considered was that advantaged children may adapt and habituate to stimuli more rapidly because of their superior information processing abilities and thus advantaged Ss needed to spend less time with each object to assimilate it than did disadvantaged Ss. This hypothesis was based on Kagan's (1966) discussion of individual differences in children's abilities to assimilate external stimulation. The first of the two explanations led to the prediction that advantaged and disadvantaged children would spend about the same amount of time with each toy if they were of equal stimulus value for each group. On the other hand, the alternative explanation suggested that because of differences in information-processing ability, differences in performance between the two groups would continue with the introduction of more novel or complex toys. A new reactive object curiosity test (ROC II) was designed

to test the validity of these two hypotheses.

The performance of advantaged and disadvantaged Ss on the Motoric Inhibition Test was different from the original expectations of Mumbauer and Miller (1970) and also appeared to need further exploration. Although previous investigators (Maccoby, Dowley, Hagen, and Degerman, 1965) had found a significant, positive correlation between S's ability to inhibit motor behavior upon verbal request and their IQ, Mumbauer and Miller did not find a significant correlation between these two variables. It was speculated that age of S might be a critical variable in that under five years ability to respond to requests to inhibit motor responses is related to intellectual development but that after five most children within the normal range of intellectual ability can inhibit their motor responses. Maccoby, et al. (1965) Ss were between four and five; Mumbauer and Miller Ss were five thru six.

Socioeconomic differences in performance on the Matching Familiar Figures Test (MFFT) were also found by Mumbauer and Miller (1970). However, contrary to expectation these differences were no longer significant when the relationship of intellectual performance measured by the Stanford Binet was factored out.

To further explore the findings of the Mumbauer and Miller (1970) study, the children who had served as Ss in that study were again tested after approximately six months. During the interim advantaged Ss had attended private kindergarten; disadvantaged Ss had attended the Demonstration and Research Center for Early Education, a half day enrichment program for disadvantaged children. To test the alternative explanations of ROC data, the original ROC and a second version of this task were given Ss. More complex toys designed for older children made up ROC II. The MIT was also given again. Modifications were made in the instructions so that

slowly instructions were modeled for the children. The MFFT was again given to check for developmental differences expected on the basis of Kagan's (1966) work with older Ss.

Method

Subjects

Subjects were 28 children selected from two Nashville preschools serving middle and upper middle class families and 28 children from the Nashville area preschools for the culturally disadvantaged. Occupations of the fathers of the advantaged group fell into groups I, II and III on the Hollingshead (1965) Scale, while ratings of VI and VII were appropriate for occupations of the fathers in the disadvantaged sample. One half the children in the disadvantaged sample were from the urban metropolitan area, half were from a nearby rural community. One half of the urban sample or one-fourth the total disadvantaged sample was black; one child within the middle class sample was also black. An equal number of subjects within each socioeconomic group were males and females. On the first testing all S's ranged in age from four years, eight months to five years, eight months. The mean age for the advantaged group was five years, five months; while that of the disadvantaged group was five years, four months. On the second testing which occurred approximately six months after the first testing, all Ss ranged in age from five years, two months to six years, two months. The mean age for the advantaged group was five years, eleven months; while that of the disadvantaged group was five years, nine months.

Procedure

At the time of the fall testing, all subjects were given the Stanford-Binet IQ Test within six weeks prior to the remainder of the test battery. Among the tests which all subjects were given individually by two female E's were the MFFT, MIT, and ROCT. Two other tests were also given, but were not given at the second testing and will not be discussed. The MFFT and a companion test were given in the first session and their order was counterbalanced. The MIT and ROCT were given in counterbalanced order during the last session. A third test was always given as the final test of the last session. At the time of the second testing all Ss were individually given the MFFT and MIT, the original ROC and a second version of the Reactive Object Curiosity Test (ROCT II). Subjects were tested by two female E's over two sessions. The order of the test given was counterbalanced.

On both the first and second testing, the MFFT was administered according to the procedures specified by Mumbauer and Miller (1970). On each trial of the MFFT, the child was presented a standard stimulus along with six comparison stimuli, five of which varied slightly in detail from the standard. He was told to point to the one which was the same as the standard. If his first response was incorrect, he was so informed and allowed to continue attempting solution until he was correct. Two practice and twelve test trials were given. The mean reaction time to first response and number of errors was recorded for each S.

During the first testing, a procedure similar to that described by Maccoby et al. (1965) was used. During the second testing session, the administration of the MIT was modified in that instructions to perform slowly were modeled on each of the three subtests. On the first of these subtests, the child was shown a sheet of paper

with pictures of two telephone poles approximately eleven inches apart connected by a wire and was asked to draw another wire between them. When he finished he was given a second sheet and asked to draw the line as slowly as he could. On the second subtest, he was asked to crank a toy car hooked to the end of a thirty inch train on the wench of a toy wrecker truck and then to crank it as slowly as he could. On the final subtest the S was asked to walk between six foot long lines placed five inches apart and then walk as slowly as he could. A z transformation was made on each subtest time under slow instructions before subtest scores were summed to yield the mean time under slow instructions for each S. The above procedure was followed for the second administration of the MIT with the following modifications. After the experimenter asked the subject to draw a line slowly, crank the truck, or walk the line, the E modeled walking, cranking or drawing slowly for the subject. E maintained a pace of approximately 45 to 60 seconds for each slowly demonstration. The S was then asked to perform the action as slowly as he could. z transformations were made then for the time under slowly instructions for each S for the second administration of the MIT.

The ROC consisted of a nine foot square vinyl mat marked into 27 square inches. In each square a toy was placed under an opaque bucket. The S was taken to the middle of the mat and told there were toys under the covers with which he could play while the E was gone. It was emphasized that he could play with whatever he liked in E's absence. E left and S observed from a one way glass for five minutes. The number of contacts and manipulations he made were counted and the duration of the manipulations were recorded. A contact was defined as lifting a cover and a manipulation as touching and/or manipulating a toy. This test was administered

in the same fashion on both the first and second testing. The ROC II consisted of a six-foot square vinyl mat marked into 24 inch squares. In each square a toy was placed under a box. The procedure for introducing the subject to the game or to the toys was exactly the same as the first ROC test. This test differed from the first ROC test in that the toys in the first test were simple dime-store toys costing between 15 cents and a dollar. Toys in this second ROCT were more complex toys costing between $2.50 and $10.

Results

A 2 (Groups) x 2 (Trials) analysis of variance was carried out on the data from ROC I Contacts, manipulations and $\overline{X}$ manipulation time, MIT $\overline{X}$ time under slow instructions and MFFT reaction time (RT) and Error.

No main effects were significant at the .05 level or beyond on the repeated measures analyses of variance of ROC I data. Only the Groups X trials interaction for $\overline{X}$ manipulation time reached .05 level of significance ($F_{1, 54} = 5.08$ $p < .03$). Interactions on the dependent measures of contacts and manipulations did not reach statistical significance. Table I presents the means of the Groups X Trials interaction.

A simple analyses of variance was carried out on the contacts, manipulations and $\overline{X}$ manipulation time of ROC II data. No significant difference between the two groups at the .05 level or beyond was found on any of the three dependent measures.

The 2 (Groups) x 2 (Trials) repeated measures analysis of variance carried out on the MIT mean time under slowly conditions did not produce any significant effects.

The same repeated measures analysis of variance completed on latency and error MFFT data resulted in statistically significant main effects. The main effect for Groups ($F_{1, 54} = 4.56$ $p < .04$) and Trials ($F_{1, 54} = 36.04$ $p < .000$) on MFFT latency

scores were statistically significant. Statistical significance was also reached for main effects of Groups ($F1, 54 = 13.10$ $p < .001$) and Trials ($F1, 54 = 33.17$ $p < .000$) on the analysis of MFFT errors. The groups by Trials interaction was not significant. Table 2 presents the Groups X Trials latency means; Table 3, the Groups X Trial error means.

A Pearson Product Moment correlation analysis was run between IQ obtained during the first testing and ROC I and II dependent measures from the second testing. In the second administration of the ROC correlations between contacts, manipulations, and mean manipulation time and IQ ($r = .24$, $r = -.20$, $r = .08$) did not reach the .05 level of significance. Nor were these r's significant for comparable ROC II scores ($r = .14$, $r = .01$, $r = -.14$).

Table I

ROC I Mean Manipulation Time

	Time I	Time II
Advantaged	23.72	25.52
Disadvantaged	51.31	23.92

Table II

MFFT Mean Latency

	Time I	Time II
Advantaged	7.75	10.47
Disadvantaged	5.37	8.73

Table III

MFFT Mean Error

	Time I	Time II
Advantaged	24.11	19.71
Disadvantaged	30.43	24.25

Discussion

The results from the analyses of ROC I and II data suggest that differences in amount of time spent with the toys depends on the novelty or interest value of the toy rather than the information processing capacities of the S. Inspection of the means making up the significant Groups X Trials interaction of $\overline{X}$ manipulation time for objects on the first and second administrations of ROC I indicated that the amount of time disadvantaged Ss spent dropped from the first to second testings while the time for advantaged Ss remained approximately the same. Advantaged and disadvantaged Ss differed on the first but not on the second testing. Advantaged Ss appeared to have reacted with minimal interest during both experiences with the toys while the interest of the disadvantaged changed with experience and time. Not only had disadvantaged Ss had the experience of first testing to get acquainted with the toys, but they had had the intervening preschool opportunities to interact with a variety of objects.

Further support for the stimulus value hypothesis was found in examination of the mean looking times of ROC I and II and the means composing the Groups analyses of ROC II data. Mean looking time for all Ss were longer on ROC II

than 1, but there were no group differences on ROC II. ROC II objects appear to have been equally stimulating for the two groups. This was the type of outcome predicted from a stimulus value hypothesis and contrary to the expectations based on the idea of an information processing difference between the two groups of Ss.

Despite changes in instructions to include a modeling of the MIT slowly condition, results from MIT data analyses were very similar to those of the previous study (Mumbauer & Miller, 1970). No differences were found between middle and lower income Ss' ability to inhibit motor movement at verbal request by an adult.

That latency increased and errors decreased over time in both groups supports Kagan's (1966) notion that reflectivity increases with age. A relatively greater increase on the part of Ss from lower income homes would have been desirable in view of their participation in the preschool enrichment program. Unfortunately a significant groups by trials interaction was not found to provide evidence for this expectation.

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